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EDITORIAL

OTHNIEL CHARLES MARSH has left for himself as conspicuous a name and fame as could be desired by the most ambitious student of science. He had the advantages of a strong constitution, a clear intellect, indefatigable industry, a liberal fortune, a love of nature and the beautiful, a single purpose, and had no one dependent upon him for a share of his devotion. He began life in Lockport, New York, in October 29, 1831; as a boy was fond of hunting and fishing and out-door life; went to Phillips Andover Academy in 1852, graduated in Yale College in 1860, and took two more years of graduate work in the Sheffield Scientific School. In those days he was chiefly interested in chemistry and mineralogy. Then he went to Europe, where he spent three years studying mineralogy and paleontology, and in 1866 was appointed professor of paleontology in Yale University. From that time to the day of his death, March 18, 1899, he was devoted to original research, chiefly in the accumulation and study of fossil vertebrates, and to the building up of the Peabody Museum at Yale University, to which he gave at the close of his life all his collections and the great bulk of his fortune.

The contributions Professor Marsh made to science during his busy life are chiefly remarkable for the large number of startling new types of fossil vertebrates which he either first announced or brought to conspicuous notice by the number and perfection of the specimens representing them. His earlier investigations were in the Cretaceous deposits of the East; but his most remarkable discoveries were in the Jurassic, Cretaceous, and Tertiary beds of the Rocky Mountain regions, and in the plains east of them. In this latter region he conducted several expeditions of Yale students or graduates; and after the fossil-bearing beds were discovered, employed many collectors for repeated years in digging out and shipping to the East the immense and rare bones, which were carefully worked out after reaching the Museum.

A bare list of the more important types of vertebrates, which he either first discovered or first elaborated, is of itself enough to exhibit the great place his labors must occupy in the progress of science.

In 1862, he announced the discovery of the Enaliosaurus in the Carboniferous rocks of Nova Scotia—a large Amphibian with biconcave vertebræ. It was Marsh who, in 1868, disputed the organic nature of Paleotrochis; and in the same year the metamorphosis of the Siredon was described. Fossil birds were discovered in both Tertiary and Cretaceous rocks, in 1870. The Rocky Mountain expedition of 1870 resulted in the discovery of the *Mauvaises Terres* formation in Colorado. In 1871, fossil serpents were reported from the Tertiary deposits of Wyoming, and a gigantic Pterodactyl from the Cretaceous of Kansas. In the following year Hesperonis, the wonderful bird with teeth, was announced, and the skull and limb bones of the Mosasaurus, the skeleton of Tinoceras, and remains of Quadrumana from the Eocene of Wyoming described. In 1873, new species of Ichthyornis, another toothed bird, were described, and a new subclass, Odontornithes, was founded, establishing the link between Birds and Reptiles. And the new order Dinocerata, with many enormous species, was defined and elaborated. In 1874, another expedition was conducted to the Rockies, and the Brontotheridæ were fully defined, and the fossil horses and their ancestors of the Tertiary were described. Also, a paper was written illustrating the small brain capacity of the early Eocene mammals. In 1875, a new order of Eocene mammals was announced, and an important statement of the affairs of the Red Cloud agency was made to the President.

In the following year the characters of the Dinocerata, the Tillodontia, the Brontotheridæ, the genus Coryphodon, and a new suborder of Pterosauria, were elaborated in important papers. In 1877, wonderful Dinosaurs from the Jurassic were brought to light; and in 1878, new species of Ceratodus, of Dinosaurs, and of Pterodactyles were described. The next year he described another new order, the Sauranodonta from the Jurassic of the Rocky Mountains, and wrote the paper on Polydactyl horses, recent and fossil, setting forth in brief the history of the horse ancestry. The monograph on the Odontornithes was published in 1880. Numerous papers followed as the great and peculiar types of Dinosaurs were worked out; the Stegosaurus, the Brontosaurus, the Ceratopsidæ, Triceratops, etc.; and in 1896, an elaborate report on the Dinosaurs was published as a part of the Sixteenth Annual Report of the United States Geological Survey, not in the form of a monograph. In 1884. the skull of Pteranodon, the Pterodactyl without teeth, was elaborated, and the monograph on the Dinocerata, the gigantic extinct order of mammals, was published.

During the last ten years of his life, although there were fewer great discoveries to announce, the papers in elaboration of the immense accumulation of materials illustrating fossil vertebrates appeared in rapid succession; over one hundred titles having been added to the list of his published papers during these years. Among the more important contributions during this period were his discussions of the relations of *Pithecanthropus erectus;* on the age of the beds on the Atlantic coast which he called Jurassic; and important additions to knowledge of Dinosaurs, Tertiary and Cretaceous mammals, birds, fossil footprints; the description of a new Belodont reptile from the Connecticut River sandstone; and on sundry other subjects.

Professor Marsh was honored by election to membership and office in the principal societies and academies devoted to science in this and other countries. He was for two terms President of the National Academy of Sciences, and in 1897 received the Cuvier prize from the Institute of France. In 1886, he received the honorary degree of Ph.D. from the University of Heidelberg.

He died in the midst of active work. The manuscript for several other monographs on fossil vertebrates was left unfinished. Besides the large collections accumulated at his own expense, which he had turned over formally to Yale University before his death, he left a large amount of material belonging to the United States Geological Survey, which had been collected under his direction and was undergoing description. It is probably true that no other one man has ever accumulated such a vast collection of remarkable and well preserved fossil vertebrates.

H. S. W.

MR. THOMAS JONES has recently completed a reduction of his model of the earth which possesses sufficient merit and is of sufficient interest to geologists to warrant notice. The vertical exaggeration of his former globe was 36 to 1. The present is a reduction to 18 to 1. This relieves the exaggeration of most of its objectionable features and still leaves the relief impressive enough for lecture-room purposes. The first copy made has now been in use by the writer for several weeks with satisfactory results. The hypsometric data given by the Challenger Report have been followed for the oceanic basins.

T. C. C.

TO MEET an expressed desire for advanced summer courses in the fundamental principles of geology and glaciology suited to college teachers and advanced students, two courses will be offered during the first term of the summer session, July 1 to August 1, at the University of Chicago by Mr. Chamberlin. The first will consist of a discussion of basal questions and unsolved problems in geology taken up in historical order, so as to constitute in some measure a review of geological history. Following the method of multiple working hypotheses these questions will be discussed in the light of alternative theories. Some special attention will be given to a new series of hypotheses based upon the slow growth of the earth by meteoroidal accretions, these hypotheses being of such a nature as to develop with peculiar facility the strength and weakness of existing hypotheses and to open up the problems widely. The atmospheric and climatic factors will receive special attention, as will also the reciprocal development of land and sea periods, the conditions of expansional, restrictional, and provincial life evolution, and the special functions of base-leveling, sea-shelves, epicontinental seas and atmospheric changes in controlling life progress.

The course in glaciology will embrace a discussion of the physics of glaciers, their chronological development, the distinctive phenomena of glacial deposits, and their interpretation.

The two courses will run parallel. They are only offered for the coming summer.

Besides these, the usual courses in physiography, meteorology, general and structural geology and field work will be offered by Professor Salisbury, assisted by Messrs. Goode, Atwood, Calhoun, and Finch.

ERRATUM

On p. 225 of the current volume, for "The glacier on Mount Iztacciahuatl is advancing" read: the glacier on Mount Iztacciahuatl is retreating at the rate of about two meters a year. H. F. R.